Message

From: Arnold, Rick [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A545BF3329054C1B8F0F65D0F45797DE-ARNOLD, LAR]
Sent: 10/29/2020 10:59:19 PM
To: Ranalli, Anthony [Ranalli.Anthony@epa.gov]
Subject: RE: Saturation index

Great.
Thanks Tony.

From: Ranalli, Anthony <Ranalli.Anthony@epa.gov>
Sent: Thursday, October 29, 2020 4:57 PM
To: Arnold, Rick <Arnold.Rick@epa.gov>
Subject: RE: Saturation index

Yes I think so, sounds almost like they are describing a sensitivity analysis

From: Arnold, Rick <Arnold.Rick@epa.gov>
Sent: Thursday, October 29, 2020 4:42 PM
To: Ranalli, Anthony <Ranalli.Anthony@epa.gov>
Subject: RE: Saturation index

In flow modeling, a boundary condition is the way the model represents inflow to the model or outflow from the model, such as at the model edges or as pumping from wells. In a geochemical modeling context, it looks like Cadmus uses the term with respect to limits on model parameters. Does it make sense?

From: Ranalli, Anthony <Ranalli.Anthony@epa.gov>
Sent: Thursday, October 29, 2020 4:34 PM
To: Arnold, Rick <Arnold.Rick@epa.gov>
Subject: RE: Saturation index

Hi Rick,
No problem. May want to add redox of groundwater as well. Makes sense except one question I should of asked earlier. The term geochemical boundary conditions – do you mean, for example, the transition from upgradient groundwater to the restored ISR zone and from the restored ISR Zone to downgradient groundwater?

From: Arnold, Rick <Arnold.Rick@epa.gov>
Sent: Thursday, October 29, 2020 4:26 PM
To: Ranalli, Anthony <Ranalli.Anthony@epa.gov>
Subject: RE: Saturation index

Sorry to keep belaboring the point. Do you think the requirement makes sense in context?
Here's the excerpt from the permit:

Geochemical boundary conditions of the model must:
i. Accurately represent mineral phases, gas partial pressures, and concentrations of constituents in groundwater;
ii. Be based on site-specific field and laboratory data;
iii. Represent the oxidation states of the mineral assemblages; **and saturation indices of the groundwater**; and
iv. Not overly constrain model results to produce unrealistic modeling predictions.

From: Ranalli, Anthony <Ranalli.Anthony@epa.gov>
Sent: Thursday, October 29, 2020 4:02 PM
To: Arnold, Rick <Arnold.Rick@epa.gov>
Subject: RE: Saturation index

I should have stated "based on the analytical data measured on water samples collected in the field". If what you are after is should PowerTech include the saturation index of key minerals like calcite in the model like Ray and I did then yes it is reasonable. A saturation index value can be incorrect only if there is a transcription error from entering the lab value into the model code or if the analytical data has a large charge balance associated with it, in other words analytical error can lead to an incorrect saturation index value.

From: Arnold, Rick <Arnold.Rick@epa.gov>
Sent: Thursday, October 29, 2020 3:54 PM
To: Ranalli, Anthony <Ranalli.Anthony@epa.gov>
Subject: RE: Saturation index

So, if the SI is calculated based on mineral quantities and groundwater concentrations, is it something that needs to be "represented"? Could an incorrect value ever be entered as input?

From: Ranalli, Anthony <Ranalli.Anthony@epa.gov>
Sent: Thursday, October 29, 2020 3:25 PM
To: Arnold, Rick <Arnold.Rick@epa.gov>
Subject: RE: Saturation index

Hi Rick,
Yes it is reasonable. PHREEQC calculates saturation indexes based on the analytical data measured on field samples and is a routine output for any of the various functions of PHREEQC. In other words anytime data is entered into PHREEQC saturation indexes are calculated.
Tony

From: Arnold, Rick <Arnold.Rick@epa.gov>
Sent: Thursday, October 29, 2020 3:21 PM
To: Ranalli, Anthony <Ranalli.Anthony@epa.gov>
Subject: Saturation index

Hi Tony,

Just a thought – is the saturation index something that can be verified based on field data? Is it reasonable to ask Powertech to "represent the saturation indices of the groundwater" in the model?
Thanks.

Rick Arnold
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